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US and Global Dependence on Middle Eastern Energy Exports: 2004-2030

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The election campaign is over and it is time for both parties, and the Administration and the Congress, to be honest about energy. The US can and must find substitutes for petroleum, but this will take decades. In the interim, the US and the global economy will actually become steadily more dependent on energy imports, and particularly on energy imports from the Gulf. The Department of Energy estimates that oil will account for some 39% of the world's energy consumption through 2015, and that the US and its major trading partners in developing Asia will account for 60% of the increase in world demand through this period.¹¹

The MENA Share of Oil Reserves and Global Oil Production Capacity

The MENA region has some 63% of all of the world's proven oil resources, and some 37% of its gas. In 2001, the Gulf alone had over 28% of all of the world's oil production capacity, and the entire MENA region had 34%.² These reserves, and low incremental

¹ See <http://www.eia.doe.gov/emeu/cabs/pgulf.html>, DOE/EIA estimated in September 2004 that the Persian Gulf contains 715 billion barrels of proven oil reserves, representing over half (57%) of the world's oil reserves, and 2,462 Tcf of natural gas reserves (45% of the world total). Also, at the end of 2003, Persian Gulf countries maintained about 22.9 MMBD of oil production capacity, or 32% of the world total. Perhaps even more significantly, the Persian Gulf countries normally maintain almost all of the world's excess oil production capacity. As of early September 2004, excess world oil production capacity was only about 0.5-1.0 MMBD, all of which was located in Saudi Arabia.

According to the Energy Information Administration's International Energy Outlook 2004, Persian Gulf oil production increased from 18.7 MMBD in 1990 to 22.4 MMBD in 2001. It is expected to reach about 27.9 MMBD by 2010, and 38 MMBD by 2020, and 45.0 MMBD in 2025. This would increase Persian Gulf oil production capacity to over 33% of the world total by 2020, up from 28% in 2000.

The estimate does, however, change significantly in the high oil price case: It is expected to reach about 21.4 MMBD by 2010, and 27.3 MMBD by 2020, and 32.9 MMBD in 2025.

² Estimates differ according to source, The last comprehensive USGS analysis was performed in 2000, and was seriously limited by the fact many countries were affected by war or internal turmoil and declared reserves without explaining them or provided data by field. Standard estimates of reserves by non-USGS sources like those in the *Oil and Gas Journal* and *World Oil* do not adjust reported data according to a standardized methodology or adjust for the large number of countries that never alter their estimates of reserves for actual production.

For example, six of the ten nations with the largest proven reserves are in the MENA region. An IEA analysis shows a range of 259-263 billion barrels for Saudi Arabia, 105-133 billion for Iran, 66-98 billion for the UAE, and 31-29 billion for Libya.. The figure of 115 billion for Iraq is consistent only because it is a figure announced in the past by the Iraqi government and there are no accurate, verified estimates. To put these figures in perspective, the range for Russia is 60-69 billion, 25-35 billion for Nigeria, 23-21 billion for the US, and 52-78 billion for Venezuela. (International Energy Agency, "Oil Market Outlook," World Energy Outlook, 2004, OECD/IEA, Paris, October 2004, Table 3.2.)

Estimates alter radically if an unconventional oil reserve like Canadian tar sands are included. The Middle East has only about 1% of the world's known reserves of oil shales, extra heavy oil, tar sands, and bitumen. Canada has 36%, the US has 32%, and Venezuela has 19%. The rest of the world has only 12%. The cost-effectiveness of producing most of these reserves, and the environmental impact, is highly uncertain, however, even at high oil prices. (International Energy Agency, "Oil Market Outlook," World Energy Outlook, 2004, OECD/IEA, Paris, October 2004, Figure 3.13.)

production costs, ensure the region will dominate increases in oil production through at least 2015. The EIA estimates that Saudi Arabia alone will account for 4.2 MMBD of the total increase, Iraq for 1.6 MMBD. Kuwait for 1.3 MMBD, and the UAE for 1.2 MMBD. These four countries account for 8.3 MMBD out of a worldwide total of 17.9 (46%). To put these figures in perspective, Russia will account for an increase of only 1.3 MMBD.³

The International Energy Agency estimates cover a longer period than the EIA estimates. They predict that that total conventional and non-conventional oil production will increase from 77 MMBD in 2002 to 121.3 MMBD in 2030. This is a total increase of 44.3 MMBD worldwide. The Middle East will account for 30.7 MMBD, or 69% of this total. The IEA also estimates that the rate of dependence on the Middle East will increase steadily after 2010 as other fields are depleted in areas where new resources cannot be brought on line. It estimates that 29 MMBD, or 94% of the total 31 MMBD increase in OPEC production between 2010 and 2030 will come from Middle Eastern members of OPEC.⁴

Changing Patterns in Import Dependence that Affect the US Role in a Global Economy

This dependence will be easier to secure with a friendly and stable Iraq, but the US has no choice. The US Energy Information Agency (EIA) summarizes the trends in Gulf oil exports as follows in its International Energy Outlook for 2004, and it should be noted that its estimates are based on favorable assumptions about increases in other fuels like gas, coal, nuclear and renewables, and favorable assumptions about increases in conversion and energy efficiency:⁵

In 2001, industrialized countries imported 16.1 million barrels of oil per day from OPEC producers... Of that total, 9.7 million barrels per day came from the Persian Gulf region. Oil

Reserve estimates also change radically if ultimately recoverable reserves are included, and not simply proven reserves. Some estimates put the total for such reserves at around 2.5 times the figure for proven reserves. For example, the IEA estimate for the Middle East drops from around 60% to 23%. Such estimates are speculative however, in terms of both their existence and recovery price, and do not have significant impact on estimates of production capacity through 2025-2030. They also ignore gas and gas liquids. The Middle Eastern share of undiscovered oil and gas resources rises to 27% based on existing data.

Such estimates are also heavily biased by the fact that so little experimental drilling searching for new fields occurred in the Middle East between 1992 and 2002. The IEA estimates that only 3% of some 28,000 wildcat explorations for new fields worldwide took place in the Middle East. Recent exploration in key countries like Iran, Iraq, and Libya has been minimal. Some 50 Saudi fields, with 70% of the reserves that are proven, still await development. (International Energy Agency, "Oil Market Outlook," World Energy Outlook, 2004, OECD/IEA, Paris, October 2004, Figure 3.15.).

³ Guy Caruso, "US Oil Markets and the Middle East, DOE/EIA," October 20, 2004.

⁴ IEA estimate in the World Energy Outlook for 2004, Table 3.5, and analyzed in Chapter 3.

⁵ The DOE/EIA, International Energy Outlook for 2004, can be found at <http://www.eia.doe.gov/oiaf/ieo/download.html>.

movements to industrialized countries represented almost 65 percent of the total petroleum exported by OPEC member nations and almost 58 percent of all Persian Gulf exports.⁶

*By the end of the forecast period (2025), OPEC exports to industrialized countries are estimated to be about 11.5 million barrels per day higher than their 2001 level, and more than half the increase is expected to come from the Persian Gulf region.*⁷

⁶ See <http://www.eia.doe.gov/emeu/cabs/pgulf.html>. In 2003, Persian Gulf countries had estimated net oil exports of 17.2 MMBD of oil (see pie chart). Saudi Arabia exported the most oil of any Persian Gulf country in 2003, with an estimated 8.40 MMBD (49% of the total). Also, Iran had estimated net exports of about 2.6 MMBD (15%), followed by the United Arab Emirates (2.4 MMBD -- 14%), Kuwait (2.0 MMBD -- 12%), Iraq (0.9 MMBD -- 9%), Qatar (0.9 MMBD -- 5%), and Bahrain (0.01 MMBD -- 0.1%).

U.S. gross oil imports from the Persian Gulf rose during 2003 to 2.5 MMBD (almost all of which was crude), from 2.3 MMBD in 2002. The vast majority of Persian Gulf oil imported by the United States came from Saudi Arabia (71%), with significant amounts also coming from Iraq (19%), Kuwait (9%), and small amounts (less than 1% total) from Qatar and the United Arab Emirates. Iraqi oil exports to the United States rose slightly in 2003, to 481,000 bbl/d, compared to 442,000 bbl/d in 2002. Saudi exports rose from 1.55 MMBD in 2002 to 1.77 MMBD in 2003. Overall, the Persian Gulf accounted for about 22% of U.S. net oil imports, and 12% of U.S. oil demand, in 2003.

Western Europe (defined as European countries belonging to the Organization for Economic Cooperation and Development -- OECD) averaged 2.6 MMBD of oil imports from the Persian Gulf during 2003, an increase of about 0.2 MMBD from the same period in 2002. The largest share of Persian Gulf oil exports to Western Europe came from Saudi Arabia (52%), with significant amounts also coming from Iran (33%), Iraq (7%), and Kuwait (6%).

Japan averaged 4.2 MMBD of net oil imports from the Persian Gulf during 2003. Japan's dependence on the Persian Gulf for its oil supplies increased sharply since the low point of 57% in 1988 to a high of 78% in 2003. About 30% of Japan's Persian Gulf imports in 2003 came from Saudi Arabia, 29% from the United Arab Emirates, 17% from Iran, 12% from Kuwait, 11% from Qatar, and around 1% from Bahrain and Iraq combined. Japan's oil imports from the Persian Gulf as a percentage of demand continued to rise to new highs, reaching 78% in 2003.

⁷ Estimates by country are necessarily uncertain. The International Energy Outlook for 2004 estimate of production capacity in MMBD for MENA countries is as follows:

Country	2001	2010		2020		2025	
		Reference	High Price	Reference	High Price	Reference	High Price
Iran	3.7	4.0	3.5	4.7	3.8	4.9	4.3
Iraq	2.8	3.7	2.9	5.3	3.7	6.6	4.6
Kuwait	2.3	3.7	2.3	4.4	2.9	5.0	3.4
Qatar	0.6	0.6	0.6	0.8	0.7	0.8	0.7
Saudi Arabia	10.2	13.2	9.4	18.2	12.9	22.5	16.0
UAE	2.7	3.3	2.7	4.6	3.3	5.2	3.9
Total Gulf	22.4	27.9	21.4	38.0	27.3	45.0	32.9
Algeria	1.6	2.0	1.6	2.4	2.0	2.7	2.2
Libya	1.7	2.0	1.7	2.6	2.1	2.9	2.4
Other Middle East	2.0	2.2	2.4	2.6	2.9	2.8	3.1
Total Other	4.3	6.2	5.7	7.6	7.0	8.4	7.7
Total MENA	26.7	34.1	26.1	45.6	34.3	53.4	40.6
Total World	79.3	95.1	90.0	114.9	107.2	126.1	117.3
(US)	9.0	9.5	9.9	8.9	9.6	8.6	9.0

Despite such a substantial increase, the share of total petroleum exports that goes to the industrialized nations in 2025 is projected to be almost 9 percent below their 2001 share, and the share of Persian Gulf exports going to the industrialized nations is projected to fall by about 13 percent. The significant shift expected in the balance of OPEC export shares between the industrialized and developing nations is a direct result of the economic growth anticipated for the developing nations of the world, especially those of Asia.

OPEC petroleum exports to developing countries are expected to increase by more than 18.0 million barrels per day over the forecast period, with three-fourths of the increase going to the developing countries of Asia. China, alone, is likely to import about 6.6 million barrels per day from OPEC by 2025, virtually all of which is expected to come from Persian Gulf producers.

North America's petroleum imports from the Persian Gulf are expected to double over the forecast period. At the same time, more than one-half of total North American imports in 2025 are expected to be from Atlantic Basin producers and refiners, with significant increases expected in crude oil imports anticipated from Latin American producers, including Venezuela, Brazil, Colombia, and Mexico. West African producers, including Nigeria and Angola, are also expected to increase their export volumes to North America. Caribbean Basin refiners are expected to account for most of the increase in North American imports of refined products. With a moderate decline in North Sea production, Western Europe is expected to import increasing amounts from Persian Gulf producers and from OPEC member nations in both northern and western Africa. Substantial imports from the Caspian Basin are also expected.

Industrialized Asian nations are expected to increase their already heavy dependence on Persian Gulf oil. The developing countries of the Pacific Rim are expected to almost double their total petroleum imports between 2001 and 2025.

While quantified estimates of export dependence are uncertain, it is clear that it would take a massive breakthrough(s) in technology or discoveries of reserves outside the Middle East and North Africa (MENA) to change these trends.

Dependence on MENA Export Security and High Rates of Energy Investment in the Region

Moreover, both the military security of the MENA region, and its ability to achieve the necessary investment in new energy production are critical US strategic interests. For example, some 40% of all world oil exports now pass daily through the Strait of Hormuz

OPEC data are labeled confidential but are very similar. The IEA does not provide country-by-country estimates, but uses very similar models with similar results. It estimates total world production was 77 MMBD in 2002, and will increase to 121 MMBD in 2030. If one looks at the data for the Middle East, the latest IEA estimates are as follows:

The IEA estimate in the World Energy Outlook for 2004, Table 3.5, is:

	2002	2010	2020	2030	Ave. Annual Growth
OPEC Middle East	19.0	22.5	37.4	51.8	3.6%
Other Middle East	2.1	1.8	1.4	1.0	-2.7%
Total	21.1	24.3	38.8	52.8	
Non-Conventional Oil (Worldwide)	1.6	3.8	6.1	10.1	6.7%
World	77.0	90.4	106.7	121.3	1.6%

and both EIA and IEA projections indicate this total will increase to around 60% by 2025-2030.⁸

The IEA projections, for example, indicate that Middle Eastern Exports will total some 46 MMBD by 2030, and represent more than two-thirds of the world total. This means that the daily traffic in oil tankers will increase from 15 MMBD and 44% of global interregional trade in 2002, to 43 MMBD and 66% of global interregional trade in 2030. This means that the daily traffic in LNG carriers will increase from 28 BCM and 18% of global interregional trade in 2002, to 230 carriers and 34% of global interregional trade in 2030.⁹ The IEA does, however, estimate that these increases would be some 11% lower if oil prices remained consistently high in constant dollars.

The International Energy Agency also estimates that imports will rise from 63% of total OECD demand for oil in 2002 to 85% in 2030 some \$3 trillion dollars must be invested in the oil sector from 2003 to 2030 to meet world demand for oil, and something approaching half of this total must be invested in the Middle East. Some \$234 billion will be required for tankers and oil pipelines, and again, a substantial amount must go to the MENA area.¹⁰

The US Buys Oil in a Global Market, Not From Countries Per Se

Under most conditions, the normal day-to-day destination of MENA oil exports is strategically irrelevant. Oil is a global commodity, which is distributed to meet the needs of a global market based on process bid by importers acting in global competition. With the exception of differences in price because of crude type and transportation costs, all buyers compete equally for the global supply of available exports, and the direction and flow of exports changes according to marginal price relative to demand. As a result, the percentage of oil that flows from the MENA region to the United States under normal market conditions has little strategic or economic importance. If a crisis occurs, or drastic changes take place in prices, and the U.S. will have to pay the same globally determined price as any other nation, and the source of US imports will change accordingly.

⁸ See <http://www.eia.doe.gov/emeu/security/choke.html#HORMUZ>. The Strait is the narrow passage between Iran and Oman that connects the Persian Gulf with the Gulf of Oman and the Arabian Sea. It consists of 2-mile wide channels for inbound and outbound tanker traffic, as well as a 2-mile wide buffer zone. The EIA estimates that some 13 MMBD flowed through the Strait in 2002. The IEA puts the figure at 15 MMBD in 2003. Both agencies indicate that the amount of oil moving by tanker will increase steadily as Asian demand consumes a larger and larger share of total exports.

Closure of the Strait of Hormuz would require use of longer alternate routes (if available) at increased transportation costs. Such routes include the 5 million-bbl/d capacity Petrolina (East-West Pipeline) and the 290,000-bbl/d Abqaiq-Yanbu natural gas liquids line across Saudi Arabia to the Red Sea. Theoretically, the 1.65-MMBD Iraqi Pipeline across Saudi Arabia (IPSA) also could be utilized, more oil could be pumped north to Ceyhan (Turkey), and the 0.5 million-bbl/d Tapline to Lebanon could be reactivated.

⁹ International Energy Agency, "Oil Market Outlook," World Energy Outlook, 2004, OECD/IEA, Paris, October 2004, Table 3.7 and 3.8.

¹⁰ International Energy Agency, "Oil Market Outlook," World Energy Outlook, 2004, OECD/IEA, Paris, October 2004, Chapter 3.

Moreover, the U.S. is required to share all imports with other OECD countries in a crisis under the monitoring of the International Energy Agency.

The size of direct imports of petroleum is also only a partial measure of strategic dependence. The U.S. economy is dependent on energy-intensive imports from Asia and other regions, and what comes around must literally go around. While the EIA and IEA do not make estimates of indirect imports of Middle Eastern oil in terms of the energy required to produce the finished goods, the US imports them from countries that are dependent on Middle Eastern exports, analysts guess that they would add at least 1 MMBD to total US oil imports. To put this figure in perspective, direct US oil imports increased from an annual average of 7.9 MMBD in 1992 to 11.3 MMBD in 2002, and 2.6 MMBD worth of US petroleum imports came directly from the Middle East in 2002.¹¹ If indirect US imports, in the form of manufactured goods dependent on imports of Middle Eastern oil were include, the resulting figure might well be 30-40% higher than the figure for direct imports.

US Dependence on the Flow of Exports to Other Importers

Moreover, the US and other industrialized states are increasingly dependent on the health of the global economy. With the exception of Latin America, Mexico, and Canada, all of America's major trading partners are critically dependent on Middle Eastern oil exports. In 2002, the Middle East and North Africa supplied 5.0 MMBD of 11.9 MMBD of European imports (42%). MENA exporters supplied 4.0 MMBD of Japanese imports of 5.1 MMBD (79%). While MENA countries supplied 0.8 MMBD out China's imports of 2.0 MMBD (39% and growing steadily in recent years), 0.2 MMBD of Australia's imports of 0.6 MMBD (33%), and 6.5 MMBD of some 8.6 MMBD in imports by other Asian and Pacific states (76%).¹²

The EIA and IEA project that the global economy will also grow far more dependent on the Middle East and North Africa in the future. The EIA's International Energy Outlook 2004 projects that North American imports of MENA oil will increase from 3.3 MBD in 2001 to 6.3 MMBD in 2025 – an increase of 91%, almost all of which will go to the US. The increase in exports to Western Europe will be from 4.7 MMBD to 7.6 MMBD, an increase of 62%. This assumes major increases in oil exports from the FSU and conservation will limit the scale of European imports from the Middle East. Industrialized Asia – driven by Japan – will increase its imports from 4.1 MMBD to 6.0 MMBD, or nearly 50%. China will increase its imports from 0.9 MMBD to 6.0 MMBD, or by nearly 570%; and Pacific Rim states will increase imports from 5.0 MMBD to 10.2 MMBD, or by 104%.

Projected Increases in US Direct Imports

US oil imports are only a subset of US strategic dependence on Middle East oil exports. It is important to note, however, that neither the Bush energy policy, nor any recent Congressional energy bills, are projected to have any meaningful strategic impact on US import dependence if they are ever passed into law and transformed into action. It takes

¹¹ BP/Amoco, BP Statistical Review of World Energy, London, BP, 2003, p. 17.

¹² BP/Amoco, BP Statistical Review of World Energy, London, BP, 2003, p. 17.

massive shifts in US energy consumption and supply over extended periods of time to accomplish this and there are good reasons that the Bush Administration, Kerry energy policy, and Congressional advocates of different policies have either failed to make meaningful analysis of the impact of their proposals on US import dependence or have provided “blue sky” estimates that are little more than political posturing.

If one turns to the EIA estimates made since the Bush Administration came to office, it is clear that realistic models of US energy needs will lead to steady increases in US energy imports. The EIA’s 2003 Annual Energy Forecast reports that net imports of petroleum accounted for 55 percent of domestic petroleum consumption in 2001. US dependence on petroleum imports is projected to reach 68% in 2025 in the reference case. This is a rise in US net imports from 10.9 MMBD in 2001 to 19.8 MMBD in the reference case (+82%). In the low oil price case, net imports would rise to 21.1 MMBD. They would be 18.2 MMBD in the high oil price case, 17.8 MMBD in the low economic growth case, and 22.3 MMBD in the high economic growth case.¹³

The EIA’s annual US energy forecast for 2004 predicts that imports will be even higher. It reports that net imports of petroleum accounted 53 percent of domestic petroleum consumption in 2002. U.S. dependence on petroleum imports is estimated to reach 70 percent in 2025 in the reference case, versus 68 percent in the 2003 forecast. Imports are expected to be 65 percent of total consumption. In the low oil price case this number is estimated to be 75 percent.¹⁴ (The AEO2003 report indicated that estimated imports as a share of total oil consumption would be 65 percent in high price case in 2025, and 70 percent in the low price case.)

The specific figures will vary according to oil prices and the growth of the US economy, and the EIA contingency forecasts are summarized below in millions of barrels per day:¹⁵

Year and Projection	Product Supplied	Net Imports	Net Crude Imports	Net Product Imports
2002	19.8	10.5	9.1	1.4
2025				
Reference	28.3	19.7	15.7	3.9
Low oil price	31.1	23.3	18.2	5.1
High oil price	25.6	16.6	14.3	2.2
Low Growth	25.9	17.6	15.0	2.6
High Growth	30.6	21.8	16.4	5.4

In 2002, net US imports of petroleum accounted for 53 percent of domestic petroleum consumption. Increasing dependence on petroleum imports is projected, reaching 70 percent in 2025 in the reference case. The corresponding import shares of total consumption in 2025 are expected to be 65 percent in the high oil price case and 75 percent in the low oil price case

Continuing US Import Dependence

In short, the practical problem for the foreseeable future is how to ensure that the MENA

¹³ EIA, Annual Energy Outlook, 2003, pp. 80-84.

¹⁴ Energy Information Administration, Annual Energy Outlook 2004, p. 95.

¹⁵ EIA, Annual Energy Outlook, 2004, Table 26

states can obtain the more than \$3 trillion the International Energy Agency estimates they will need to expand energy production capacity and exports, and to protect growing US and global dependence on MENA energy exports, particularly from the Gulf. There are no meaningful near and mid-term options that will allow the US to reduce dependence in any meaningful strategic sense at anything like today's market prices for energy. The US must shape its security policies accordingly, regardless of what happens in Iraq. It must also shape them in light of US dependence on a global economy – not simply direct US dependence on oil imports.
